

## CLAIMS

1. An electric motor comprising:
  - a stator for producing a magnetic field;
  - a rotor rotated by said magnetic field;
  - a motor shaft coupled to said rotor;

5        wherein said motor shaft includes an interior surface that is cone shaped to conduct a liquid coolant through said interior surface to cool the electric motor.

  
- 2. The electric motor of Claim 1 wherein said stator includes current-carrying coils to generate said magnetic field.
  
- 3. The electric motor of Claim 1 wherein said rotor is a squirrel cage rotor.
  
- 4. The electric motor of Claim 1 wherein said rotor includes permanent magnets.
  
- 5. The electric motor of Claim 1 further including a first set of passageways through said rotor to conduct a liquid coolant.
  
- 6. The electric motor of Claim 5 wherein said first set of passageways has entrance openings and exit openings, said entrance openings oriented about said motor shaft center line at a first diameter, said exit openings oriented about said motor shaft center line at a second diameter, 5 and said first diameter being less than said second diameter.
  
- 7. The electric motor of Claim 1 further including a second set of passageways between said rotor and said motor shaft.

8. The electric motor of Claim 7 wherein said second set of passageways have entrance openings and exit openings, said entrance openings oriented about said motor shaft center line at a first diameter, said exit openings oriented about said motor shaft center line at a second diameter, and said first diameter being less than said second diameter.

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9. An electric motor comprising:

a wound stator, said wound stator conducting current to generate a magnetic field;

5 a rotor rotated by said magnetic field;

a motor shaft coupled to said rotor, said motor shaft including a cone-shaped interior surface having an entrance opening and an exit opening; and

10 a liquid coolant propelled by centrifugal force generated by the rotation of said rotor through said cone-shaped interior surface, said liquid

coolant cooling the electric motor.

10. The electric motor of Claim 9 wherein said rotor is a squirrel cage rotor.

11. The electric motor of Claim 9 wherein said rotor includes permanent magnets.

12. The electric motor of Claim 9 wherein said liquid coolant is oil.

13. The electric motor of Claim 9 further including a first set of passageways through said rotor to conduct said liquid coolant through said rotor.

14. The electric motor of Claim 13 wherein said first set of passageways have entrance openings and exit openings, said entrance openings oriented about said motor shaft center line at a first diameter, said exit openings oriented about said motor shaft center line at a second diameter, and said first diameter being less than said second diameter.

15. The electric motor of Claim 9 further including a second set of passageways between said rotor and said motor shaft.

16. The electric motor of Claim 15 wherein said second set of passageways have entrance openings and exit openings, said entrance openings oriented about said motor shaft center line at a first diameter, said exit openings oriented about said motor shaft center line at a second diameter, and said first diameter being less than said second diameter.

17. A method of cooling an electric motor comprising:  
providing an electric motor having a stator, a rotor magnetically coupled to said stator, and a hollow motor shaft coupled to said rotor;  
rotating said rotor and said motor shaft; and  
5 generating a centrifugal force to force a liquid coolant through said hollow motor shaft.